Canadian Centre for Occupational Health and Safety

Centre canadien d'hygiène et de sécurité au travail

Effective Personal Protective Equipment Programs

Their Role and Implementation

P88-2E

88-028247

EFFECTIVE PERSONAL PROTECTIVE EQUIPMENT PROGRAMS

Their Role and Implementation

Gary T Spencer DOHS CRSP

Canadian Centre for Occupational Health and Safety

February 1988

CCOHS/CCHST

EFFECTIVE PERSONAL PROTECTIVE EQUIPMENT PROGRAMS--THEIR ROLE AND IMPLEMENTATION

This publication was prepared as a source of information for health and safety committees and others with an interest in understanding and reducing the occupational risk of the lack of use or improper use of personal protective equipment.

Each publication produced by CCOHS undergoes several stages of review. As a part of this review, representatives from government, employers, and labour are requested to comment on draft copies of CCOHS documents for technical accuracy and readability.

Although every effort is made to ensure accuracy and completeness of the information, it is understood that CCOHS makes no warranty as to the accuracy or completeness of such information and assumes no liability for any damages or loss suffered as a result of any inaccuracy or incompleteness therein.

This publication is available in both official languages.

Cette publication est disponible dans les deux langues officielles.

CCOHS NUMBER P88-2E
ISBN 0-660-12771-7
DSS CATALOGUE NUMBER CC273-2/88-2E

Published 1988

---

250 Main Street East
Hamilton Ontario
L8N 1H6
416-572-2981
FAX 416-572-2206
Telex 061-8532

TABLE OF CONTENTS

	INTRODUCTION	(ii)
1.	THE ROLE OF PERSONAL PROTECTIVE EQUIPMENT PROGRAMS	1
	Planning a Protection Strategy	1
	Use of Personal Protective Equipment	3
2.	THE IMPLEMENTATION	4
	Designing a PPE Program	4
	Promotional Strategy	6
3.	PROGRAM ELEMENTS	6
	Workplace Survey	6
	Selection	7
	Fitting and Wearing	10
	Maintenance	10
	Training	11
	Support	11
	Auditing the Program	12
4.	CONCLUSION	12
	APPENDIX A: PPE CATEGORIES	13
	APPENDIX B: PPE PROGRAM CHECKLIST	15
	FURTHER READING	16

CCOHS/CCHST

INTRODUCTION

Hazards exist in every workplace, so strategies to protect workers are essential. In any workplace the priority should be the elimination and control of hazards at their source or along the path between the source and the worker. Many methods are available, and those most appropriate to the specific situation should be used.

Controlling a hazard at its source either eliminates it from the workplace altogether or isolates it from the worker and should be the first choice. This "safe place" approach may require substitution of a material with non-hazardous ones, isolation of hazards, addition of safety features to existing equipment, redesign of the work processes, or purchase of new equipment. When the hazard cannot be removed or controlled adequately, Personal Protective Equipment (PPE) must be used if the work process is to continue.

PPE is equipment worn by a worker to minimize exposure to specific occupational hazards. PPE does not reduce the hazard itself nor does it guarantee permanent or total protection. Nevertheless, PPE is widely relied on. A PPE program is only one element in a complete safety program that would use a variety of strategies to maintain a safe and healthy occupational environment.*

PPE may be used for short-term tasks, where controls do not exist and other methods cannot be used. PPE provides a secondary protection strategy (or second line of defense) against unexpected conditions, such as a spill or a leak. For example, in the unloading of a railway tank car containing hydrogen sulfide with all precautions and safety procedures in place, what would happen if a connecting line were to break? Without the backup protection of personal protective equipment, the safety of workers could not be assured.

PPE as a protection strategy is frequently abused and can fail. PPE is often mistakenly used in the workplace as a primary protection strategy or first line of defense, even though virtually every standard of industrial hygiene and accident prevention considers PPE a last-resort control strategy. Moreover, most occupational health and safety regulations emphasize the safe-place approach.

---

* For further information on health and safety programs refer to CCOHS publication, "A Basic Occupational Health and Safety Program."

CCOHS/CCHST

Sometimes the PPE strategy is not properly introduced or understood, or is regarded as a "cheap" solution to a problem. At first glance, PPE programs may appear to be simple to implement when compared to engineering programs, where solutions such as ventilation hoods or sound-absorbing barriers might be required. However, experience shows that PPE is not necessarily simpler to implement, as the last line of defense requires no less careful planning than the first.

Before any decision is made to begin or to expand a PPE program, it is important to understand the underlying principles of protection strategies. This publication sets out the role of PPE programs and provides information on how to develop and implement a comprehensive PPE program.*

---

* For further information on personal protective equipment refer to CCOHS SAFETY INFOGRAM Series : Personal Protective Equipment.

1. THE ROLE OF PERSONAL PROTECTIVE EQUIPMENT PROGRAMS

Planning A Protection Strategy

When it is recognized that a hazard exists, a strategy that removes or controls the hazardous conditions must be developed.

The selection of an appropriate strategy should be based on three elements:

- protection of workers,
- compliance with applicable laws/regulations and internal company standards, and
- technical feasibility.

In practice, only a few strategies are available. These include:

- engineering controls
- material substitution
- process change
- revised work practices
- equipment change
- use of personal protective equipment
- administrative controls

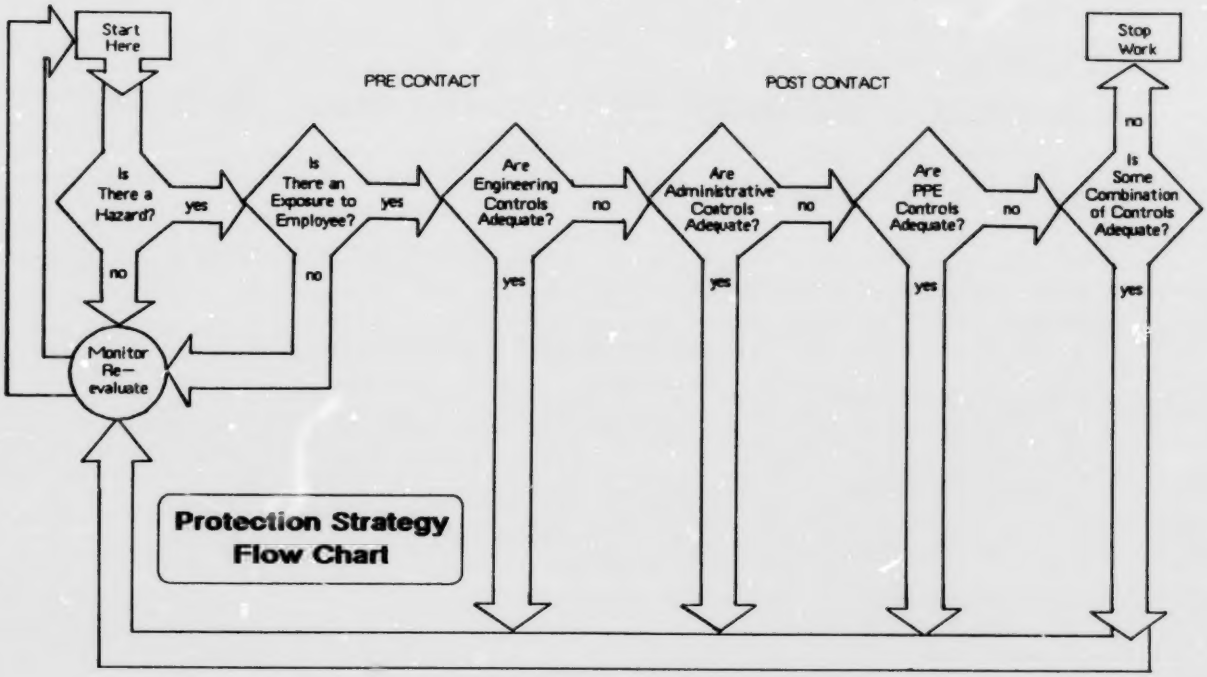
All too often, a single option is used with no attempt to integrate a group of options into the protection strategy. But a good comprehensive strategy considers the hazards, evaluates all possible control methods, integrates various approaches, and re-examines them frequently to ensure a safe work operation. It does these things by requiring that conscious decision making, evaluation, and re-evaluation be done at various stages throughout the program. The Protection Flow Chart (page 2) can assist by systematically guiding the worker and supervisor through each stage.

The evaluation of strategies should include monitoring or auditing for a change in operations or for breakdown of existing control methods (for example, breakdowns of exhaust fans).

When hazards are identified, it is useful to consider general principles of control, which can be categorized in two fundamental groups, "pre-contact" or "post-contact."

Pre-Contact

Pre-contact control is the primary method because it prevents the hazard from reaching the worker. Means for achieving pre-contact control include substituting materials or processes that are less hazardous, isolating hazardous processes, retrofitting existing equipment, or acquiring safer



Protection Strategy Flow Chart

equipment. Pre-contact control can also be achieved by providing protection along the path to the worker by local exhaust ventilation, machine guarding, better housekeeping, and safe work practices and others.

Many Canadian jurisdictions typically legislate pre-contact controls. One such law states:

> An employer shall take reasonable measures to institute engineering techniques, systems, work practices or administrative controls that eliminate or reduce to a practical minimum those hazards for which personal protective equipment is or would otherwise be required.*

While many hazards can be anticipated and avoided through effective engineering at the pre-contact stage, others may not be recognized before an accident occurs. A genuine effort to identify hazards is essential so that they may be reduced or eliminated at the source.

---

* Regulations quôted are from Alberta Occupational Health and Safety Act, Part 5, Section 82(1) and at present represent the most comprehensive general legislative provisions for personal protective equipment.

Where pre-contact controls are not practical, feasible, or totally effective, then post-contact controls must be used.

Post-Contact

The post-contact control is secondary in that it manages the hazard at the point of contact with the worker, primarily through personal protective equipment. It is to be used when pre-contact controls are not totally effective, as when workers are exposed to radiant heat from furnaces, ultraviolet or infrared rays from welding, or carbon monoxide buildup in enclosed spaces.

Canadian jurisdictions typically legislate post-contact control methods. One such law states:

> If the measures do not eliminate or reduce a hazard to a point where there is no danger to the safety or health of workers, then:
>
> - the employer shall ensure that workers use the appropriate personal protective equipment specified in this regulation, and
> - workers shall use that equipment.*

Use of Personal Protective Equipment

PPE is equipment used to eliminate or minimize the exposure or contact to injurious physical or chemical agents. A hazard would not be eliminated, but the risk of injury would be eliminated or greatly reduced. For example wearing hearing protection eliminates or reduces the likelihood of hearing damage, provided that it is used properly and that it is effective, but it does not eliminate the noise.

PPE should only be used:

- as an interim measure before controls are implemented,
- where pre-contact control technology is not available,
- where pre-contact controls are inadequate,
- during activities such as maintenance, clean up, and repair where pre-contact controls are neither feasible nor an effective means of protection, or
- during emergency situations.

PPE is categorized by the area of the body that it protects. Appendix A lists the categories, PPE devices in each category and the references to the specific Canadian Standard Association Standard for each category.

PPE is designed to meet criteria which can only approximate real working conditions. PPE should not be used when hazards are greater than those for

---

* Regulations quoted are from Alberta Occupational Health and Safety Act, Part 5, Section 82(2A,B) and at present represent the most comprehensive general legislative provisions for personal protective equipment.

which it is designed. But the unexpected cannot always be predicted. When it comes to the evaluation of potential hazards, uncertainties need to be taken into account. Unfortunately, PPE design criteria cannot always allow for all possibilities.

PPE can contribute to workplace accidents by impairing human performance.

Simultaneous use of multiple protection, such as hardhats, ear muffs and goggles, must not increase the danger or decrease the worker's ability to do the assigned job. Wearing PPE should not in itself create a greater danger. Gloves prevent skin contamination while working with moving equipment, but can create an entanglement hazard with a drill press or metal lathe.

The use of PPE is often dictated by legislation, although most regulatory agencies require that PPE not be used until the employer has taken all the necessary measures in terms of engineering controls, work practices, administrative controls, and hygiene to control the hazard.

Since the goal of an occupational health and safety program is to prevent occupational injury and illness, PPE cannot be the first protection option. The use of PPE does not prevent an accident from happening. It does not eliminate the hazard. It does not influence any pre-contact activies. It only minimizes the exposure or reduces the severity of injury or illness. PPE is a good post-contact accident control strategy. However, even at its best, PPE cannot achieve its full-protection potential without worker knowledge and co-operation. In practice PPE is only to be used as the last line of defense.

2. THE IMPLEMENTATION

Designing a PPE Program

If PPE is to be one of the control methods, consideration needs to be given to the design and implementation of a PPE program.

A PPE program must be comprehensive. It requires commitment and active participation at the planning, development, and implementation stages from all levels: senior management, supervisors, and workers. A good PPE program consists of these essential elements:

- workplace survey
- selection of appropriate controls
- fitting
- auditing of the program.
- training
- support
- maintenance

The organization's occupational health and safety policy should be a statement of principles and general rules which serve as guides to action. Senior management must be totally committed to ensuring that the policy and procedures are carried out. PPE programs must be, and must be seen to be, on a par with all other organizational policies, procedures, and programs.

Getting PPE programs to par can be accomplished by a policy statement that holds managers accountable for their health and safety performances in the same way that they are accountable for productivity and profit.

The appointment of a program co-ordinator will go a long way to ensuring the success of a program. The co-ordinator has the responsibility to ensure that each of the elements of a program is in place and operational.

The method of implementation affects the acceptance and effectiveness of the whole program. Too often, the approach has been to purchase PPE, issue it, demand that it be worn, and then discipline workers for non-compliance. Little wonder that such programs have not been successful.

The greater the workers' involvement in all stages of the program, the smoother the program will be to implement and operate. Users must be told why the PPE is to be worn and trained how to properly use it.

If a PPE device is unattractive, uncomfortable, or imposed on the worker with little choice in the selection, then compliance is likely to be poor. Where compliance is poor, as Else* showed in his Percentage Time Worn (PTW) Model, the protection afforded by the PPE will be dramatically reduced by the removal of the PPE for even short periods of time. The loss of protection during the periods in which the PPE is not worn may easily outweigh the protection when it is used.

Flexibility in the choice of protective equipment is important, provided that it conforms to proper safety standards.

In the introductory phase, a program must be planned carefully, developed fully and implemented methodically. It should be introduced gradually and in phases. The intention should be stated and time allowed for workers to become accustomed to wearing the PPE. The beneficial effects of the program should be publicized widely, and the target date set well ahead for compliance. Time should be allowed for workers to comply with the program, with no enforcement action taken until the target date. After the program is introduced, but only after adequate consultations with the workers and their representatives, the use of PPE may become a required condition of employment.

It would not be acceptable to phase in a PPE program when there is a need to enter hazardous atmospheres or where failure to use the equipment poses a significant risk of major injury, for example.

Mandatory programs are becoming popular because of the belief that they are relatively easy to enforce. Mandatory programs have a place in the workplace where hazards are varied and serious. For example hardhats must

---

* D. Else. Personal protection. In: Schilling, R.S.F., ed. Occupational health practice. Second Edition. London; Toronto : Butterworths, 1981. p. 509-528

be worn on a construction project where it is almost impossible to protect heads by other means. But even mandatory programs can become ineffective if constant re-evaluation of the program is neglected.

Promotional Strategy

The overall goal of a safer workplace is supported by a careful promotional strategy. This strategy focuses on:

- commitment by management and workers to the program and a sense of responsibility for it,
- the reasons for the program, and
- how the program will work.

The success of the PPE program depends upon winning the co-operation and support of all those concerned. This can best be achieved by helping workers understand the need to wear the PPE, and by encouraging them to want to wear it, rather than demanding that they do so. Success is more likely to be accomplished if it is shown that controls at the source and along the path have been addressed comprehensively and effectively. It may well help to have an aggressive education program within the work environment, using seminars, films, and best of all, one-on-one discussions. The use of posters and envelope stuffers can assist in the promotion of the program, but should not be used as the only means of promotion.

Many of the safety equipment suppliers may be able to help with promotion, as can safety associations and government agencies. Naturally, the education process should be supported by a clear company policy that assigns responsibility for the use of PPE and which is firmly backed.

Often the promotion of a PPE program is assisted by some form whether as a financial incentive of personal subsidies to assist with the purchase of the PPE, or as free issue by the employing organization. (This would not apply to PPE which the company is required to supply under occupational health and safety legislation.) Other types of incentives include the "Wise Owl" commendation, which is awarded to a worker who avoids injury in an accident through wearing eye protection. Such non-financial incentives reinforce training and recognize individuals for their positive actions. Such recognition serves as an example to other workers.

All PPE programs are plagued by the belief that once a piece of equipment is put on, the worker is totally protected. This is a false sense of security. Basic safety principles, such as housekeeping and environmental controls, must not be ignored.

3. PROGRAM ELEMENTS

Workplace Survey

The first step in the development of a PPE program is to identify the particular hazards at the worksite. Some of these may be obvious, but an on-site inspection should still be performed. Work practices, job procedures,

equipment, workplace layout, and individual factors may play a deciding role in the type of controls recommended for a certain job.

Evaluating the occupational environment requires a multidisciplinary approach, involving engineers, chemists, physicians, nurses, hygienists, safety officers, production supervisors and workers. Where such an approach is not always practical or feasible, one evaluation technique to overcome this is Job Hazard Analysis,* sometimes called a Job Safety Analysis. This technique reviews job methods to uncover hazards and to integrate sound safety and health principles and practices into a particular operation.

Recognizing potential hazards should include reviewing the manufacturing or other processes, maintaining an inventory of physical and chemical agents encountered routinely or periodically, examining all the different job activities of a work area, and studying the existing control measures. Every effort should be made to control all hazards, where possible, at the source.

Particular attention should be paid to job requirements that may have important consequences for the PPE selected because some types of hazards require complicated PPE solutions. For example, working with chlorine requires both eye and respiratory protection because chlorine irritates the respiratory system and mucous membranes of the eyes. It is important to continually review Material Safety Data Sheets (MSDSs) as part of the inspection, as they indicate the types of hazards associated with a material. CCOHS' CHEMINFO Data Base can assist in this task.

A workplace evaluation should involve the joint health and safety committee as an integral part of the survey team.

Selection

When a workplace survey has been completed, the data gathered are used to decide on the required engineering solutions and, if required, the PPE. As previously stated, if pre-contact controls cannot completely resolve the problem, PPE becomes a viable solution.

Once the need for PPE has been established, the task is to select the proper type. Two criteria need to be determined:

- the degree of protection required, and
- the appropriateness of the equipment to the situation (the practicality of its being used and kept in good repair).

The degree of protection and the design of PPE must be integrated because they affect its overall efficiency, wearability, and acceptance.

---

* For further information on this evaluation technique refer to CCOHS' publication, "Job Hazard Analysis."

Estimates of the degree of protection focus on the protection afforded by a PPE device, and are based upon the efficiency and effectiveness of the PPE device. The maximum degree of protection is achieved only when the actual performance of the PPE in use is equal to that of the PPE used in the original tests from which the performance data were derived. Fit, usage and state of repair affect the degree of protection given by all forms of PPE, but may be the most critical factors for respiratory protection and hearing protection. Improper fitting of PPE is the most common reason for reduced protection.

No matter how well a product is designed, if it is not worn, the degree of protection afforded will be reduced. A respirator sitting on top of the head or in a locker does not prevent exposure to contaminants.

The PTW model showed that the removal of hearing and respiratory protection for very short periods of time substantially reduces the protection afforded. If it were necessary to protect a worker exposed continuously, for eight hours per day, to a sound level of 115 dB(A), no hearing protection could provide adequate protection unless it were worn for at least 99.9 percent of the exposure duration.

A 1984 study conducted by the US Bureau of Labor Statistics indicated that 42 percent of all eye injuries occurred while the worker was wearing some type of eye protection. Obviously, a factor in these accidents was that the type of protection being used was in some way inadequate or improperly worn for the hazard involved. The advice of PPE manufacturers and suppliers may be required for choosing the most effective and up-to-date equipment.

The following are guidelines for selection:

Match PPE to the Hazard

There are no short-cuts to PPE selection. Choose PPE to match the hazard. On some jobs the same task is performed throughout the entire job cycle, so it is easy to select proper PPE. In other instances, workers may be exposed to two or more different hazards. A welder may require protection against welding gases, harmful light rays, molten metal and flying chips. In such instances, multiple protection is needed: a welding helmet, welder's goggles and the appropriate respirator, or an air-supplied welding hood.

Obtain Advice

Make decisions based on thorough hazard evaluation, worker acceptance, and types of PPE. Once you have pinpointed your PPE needs, shop around. Discuss your basic needs with trained sales representatives; then ask for their recommendations. Always ask for alternatives, and check into product claims and test data. Try out PPE before approval and test it to see that products meet all of your criteria. Only tested equipment should be introduced on a trial basis and purchased.

Institute Trials

It is extremely important to have the individual worker involved in the selection of specific models. This can be achieved by introducing approved models into the workplace through selected trials in which workers have the opportunity to evaluate various models. In this way, much information regarding fit, comfort, and worker acceptability will be gained. When choosing PPE, workers should select among two or three models, allowing for personal preferences. PPE should be individually assigned.

Consider Physical Comfort of PPE (Ergonomics)

Other important factors to consider in the selection of PPE are physical comfort and cosmetic appeal. If a PPE device is unduly heavy or poorly fitted it is unlikely that it will be worn. Note also that if a PPE device is unattractive or uncomfortable, or there is no allowance for workers to choose among models, compliance is likely to be poor. When several forms of PPE are worn together, interactions must be borne in mind. Use every opportunity to provide flexibility in the choice of PPE as long as it meets required standards.

Evaluate Cost Considerations

No one can put a price tag on safety, but cost of PPE is often a concern. Some programs use disposable respirators because they are inexpensive. But when the use is evaluated over time, it is possible that a more substantial dual cartridge respirator would be more economical. A permanent contaminant reduction solution might prove even more cost effective.

Review Standards

Performance requirements of all standards must be reviewed to ensure that exposure to injury will be minimized or eliminated by using PPE. Efficiency, and therefore degree of protection, are dictated by the design of the PPE.

In Canada, various standards exist and should be used for guidance in the selection process. The Canadian Standards Association (CSA) has standards for many categories of PPE (See Appendix A).

For example, the CSA Standard Z94.3M1982, "Industrial Eye and Face Protectors," outlines types of eye protectors recommended for particular work hazards. It classifies eye protection according to the hazard. It allows the wide variety of PPE on the market to be slotted into various categories. A review of the plant survey and these categories will help in the choice of the proper eye protection for each specific job hazard.

Safety glasses designed to the CSA standards must withstand an impact test of a 1/4" diameter steel ball travelling at a speed of 59 feet per second. When tested they must show no lens fracture, lens deformation, penetration or housing failure.

If PPE is exposed to hazards greater than those for which it is designed, it will not deliver adequate protection. This reinforces the point that PPE is not a pre-contact strategy.

Fitting and Wearing

When the selection has been made, the "fitting" component should be put in place. The key is to fit each worker with PPE on an individual basis. At the time of fitting, show each worker how to wear and maintain PPE properly.

Individual fitting programs should be carried out by qualified personnel. For example, for eye protection this qualified person could be an optometrist, an optician, a manufacturers' representative or a specially trained staff member, such as a nurse.

When safety glasses sit halfway down the nose, protection from the hazard of flying particles is reduced to some degree, sometimes to the point where no adequate protection at all is given. In this case, one must question the use of such equipment, since it has no protective function. The calculated degree of protection will not be achieved in practice unless the PPE is worn properly at all times when the worker is at risk. For example, the PTW model showed that the removal of respiratory protection for even very short periods during exposure to contaminant drastically reduces the protection given. This reduction can totally outweigh any benefit obtained from wearing protection.

Maintenance

Without proper maintenance, the effectiveness of PPE cannot be assured. Maintenance should, at the very least, include inspection, care, cleaning, repair, and proper storage.

Probably the most important part of maintenance is the need for continuing inspection of the PPE. If conscientiously performed, inspections will identify damaged or malfunctioning PPE before it is used. PPE that is not performing up to manufacturers' specifications should be discarded, such as safety glasses with scratched lenses that have lost their ability to withstand impact.

Procedures should be set up to enable workers to obtain replacement parts for damaged PPE, and to keep it clean. Respiratory protection devices require a more detailed program of repair, cleaning, storage and periodic testing.

The calculated degree of protection will not be achieved in practice unless equipment is cleaned and well maintained. Wearing poorly maintained or malfunctioning PPE could be more dangerous than not wearing any form of protection at all. The workers think they are protected when, in reality, they are not.

Training

No program can be complete without training to ensure the optimum use of PPE. This component should cover how to fit and wear PPE, how to adjust it for maximum protection, and how to care for and maintain it.

Training can be done on an individual basis or in group meetings. Training programs should re-emphasize the major goals of the program and reinforce the fact that engineering controls have been considered as the primary prevention strategy. It is not good enough to tell someone to wear a respirator just because management and/or legislation requires it. If the respirator is intended to prevent lung disorders or death, the workers should be informed of this in no uncertain terms.

Training programs require the presence of people with an appropriate level of competence in the use of PPE, if in use it is to achieve the protection levels determined in the laboratories. The burden of training that is required to constitute a successful PPE program may be considerably greater than many organizations realize when they opt for the use of PPE in preference to engineering controls.

Workers will require training in when, where, why, and how to use the equipment to achieve the necessary level of protection. Workers included should be those who are exposed on a regular basis. Also included should be those who might be exposed on an occasional basis, for example, in emergencies or when temporary work is performed in dangerous areas. The training needs and methods for all these workers are essentially the same. Training is needed, not only for those who will wear the PPE and their supervisors, but also for the selectors, buyers, and storekeepers of the equipment.

Support

Once the program is under way there will be a continuing need for involvement from management, safety and medical personnel, supervisory personnel, the health and safety committee, individual workers, and even the suppliers of the chosen PPE.

Education programs should continue on a regular basis. Top management's approval is no less important in PPE programs than in production, quality control, or cost control programs. Top management, like all other levels of the organization, must set an example. If eye protection is mandatory in a machine shop, every one who enters should wear it, without exception.

The most common reason for failure of a PPE program is the inability to overcome objections to wearing it. This inability can lead to the complete breakdown of the program. Each problem should be addressed on an individual basis. There may be a need for outside professional help.

Compliance results from a positive attitude. Negative attitudes toward the use of PPE could be caused by peer pressure, personal beliefs, lack of faith in the usefulness of the PPE, or bad experiences with it. Management

which ignores workers' concerns and complaints about PPE also weakens the program. So does apparent lack of commitment to enforce the program on the part of top management.

Improvement in compliance, which depends upon changing attitudes, is much easier to attain if there is constant concern about safety in the operation.

Auditing the Program

As with any program or procedure implemented in an organization, the effectiveness of the PPE program should be monitored by inspection of the equipment and auditing of procedures with the aid of a checklist. The checklist in Appendix B could assist in monitoring the success of a PPE program.

Annual audits appear to be the norm, but it may be advisable to review critical areas more frequently. The audit team, which should include representation from the joint health and safety committee, should receive appropriate training in audit procedures.

It would be useful to compare present production records and safety performance to those before the program began. This would help determine the success or failure of a program. Without this detailed monitoring, recommendations concerning changes to a program or retention of the program could be unsupported.

All too often, worker compliance receives more attention than any other component of a program. Compliance should be put into its proper perspective. It is the last part of the program to be implemented and not the first or only one chosen and put into effect. The program must be accepted and adhered to if it is to be successful. As with any other program, acceptance depends to a large degree upon the manner in which the program is introduced, the way in which it is conducted, and the extent to which it receives the co-operation of everyone concerned in maintaining the high standards expected in the program.

With any program, compliance should be based upon the belief that the objective is to protect against injury, disease and discomfort, and to raise safety awareness.

4. CONCLUSION

The development, implementation, and maintenance of an effective PPE program is not easy. PPE is not in itself a simple method to satisfactorily solving the problem of prevention. It must be part of an integrated solution that consciously reviews and implements other solutions.

PPE involves a large burden of planning, organization, monitoring and supervision. Above all, major retraining is involved in the introduction and maintenance of a successful PPE program. Therefore, such programs should be given careful consideration before being embarked upon as apparently cheap alternatives to control at the source.

APPENDIX A

Personal Protective Equipment Categories

PPE is designed to be worn by an individual to eliminate or minimize the exposure to injury or illness. Generally, equipment has been designed to be worn on a selected part of the body and can be categorized by the area it protects. Some PPE devices offer protection across one or more categories.

Eye and Face Protection

This category covers equipment designed to provide protection to eye and face from typical hazards that include flying objects and particles; splashing liquids; molten metal; and ultra-violet, visible and infrared radiation.

The following devices are covered in this category: spectacles, spectacles with side shields, eyecup goggles, monoframe goggles, welding helmets, and face shields.

The CSA standard* that covers this category is "Industrial Eye and Face Protectors" - Z94.3 M1982. This standard is used as the basis of product certification.

Head Protection

This category covers safety hats and caps designed to protect workers from upset, penetration and electric shock. It excludes so-called "bump caps."

The CSA standard* that covers this category is "Industrial Protective Headwear" - Z94.1 M1977. This standard is used as the basis for product certification.

Foot Protection

This category covers protective footwear with impact-resistant toe caps and additional requirements such as metatarsal protection, sole puncture protection and electric shock-resistant sole protection.

The CSA standard* that covers this category is "Protective Footwear" - Z195 M1984. This standard is used as the basis for product certification.

Hearing Protection

This category covers earplugs, earmuffs and communication headsets.

The CSA standard* that covers this category is "Hearing Protectors" - Z94.2 M1984.

Respiratory Protection

The following items are included in this category:

- air purifying respirators
  - particle-removing respirators,
  - vapour and gas-removing respirators (chemical cartridge),
  - gas masks

- atmosphere supplying respirators
  - self-contained breathing apparatus (SCBA),
  - airline systems,
  - protective suits that totally enclose the wearer and incorporate a life-support system.

The CSA standard* that covers this category is "Selection, Care, and Use of Respirators" - Z94.4 M1982.

Body Protection

This category covers chemical-protective clothing, heat-protective clothing, gloves, aprons and leggings as well as all clothing designed to minimize exposure to injury or illness (arm guards, belly guards, shin and leg guards, chemical protection suit).

Fall Protection

This category covers body belts, harnesses, lanyards, personal lowering devices, life lines and fall-arresting devices.

The CSA standards* that cover this category are:

- Fall-Arresting Safety Belts and Lanyards for Construction and Mining Industries - Z259.1 1976

- Fall-Arresting Devices, Personal Lowering Devices and Life Lines - Z259.2 M1979

- Lineman's Body Belt and Lineman's Safety Strap - Z259.3 M1978

These standards are used as the basis for product certification.

*CSA Standards may be acquired from:

Standards Council of Canada
Suite 2-401
2000 Argentia Road
Mississauga Ontario
L5N 1V8
(416) 826-8110

Canadian Standards Association
178 Rexdale Boulevard
Rexdale Ontario
M9W 1R3
(416) 747-4149

APPENDIX B

Personal Protective Equipment Program Checklist

Standards

- Is there a policy or practice governing the proper use and conservation of PPE?
- Is proper PPE made available to workers?
  - Are these devices regularly maintained and in good condition?
  - Are they being used as prescribed?
  - Is the wearing of PPE when appropriate rigorously enforced?
  - Are proper storage and cleaning facilities provided?
- Are workers fitted properly for PPE?
- Are PPE standards/rules and procedures for specific jobs defined in writing?
- Is there provision for workers to have input into identifying the needs for, and making the selection of, PPE?
- Are workers properly instructed in the need for and use of protective equipment and is a record made of that instruction?
- Are supervisors required to check PPE to ensure that it is in serviceable condition?
- Are workers required to return used or damaged equipment to receive a reissue?

Personal Protective Equipment Record Keeping

- Is the usage of PPE recorded?
  - Is an analysis made of usage?
  - Is there a record system to ensure proper cleaning and replacement of parts?

Enforcement of Rules and Procedures

- Have the rules, procedures and disciplinary format been discussed with and made acceptable to the joint health and safety committee, safety and health representatives and/or the union?
- Are commendations recorded for exemplary use of PPE?
- Is recognition given/sought when PPE has prevented or minimized injury or illness?
- Is there an established procedure that enables disciplinary action for violation of PPE rules and procedures?

Program Effectiveness Evaluated

- Is there an established procedure to enable senior management to evaluate the consistency of enforcement of the PPE program?

FURTHER READING

Cohen, A. Behavioral approaches to personal protective equipment usage. In : Symposium on occupational safety research and education : a dialogue between two communities. Cincinnati : NIOSH, 1982. p. 177-185

Hale, A.R.; Else, D. The role of training and motivation in a successful personal protective equipment program. In : COPE 84 : papers presented at the Conference on Protective Equipment. Hamilton, Ont : CCOHS; Rexdale, Ont : Canadian Standards Association, 1984. p. Open-1 to Open-24

Lafferty, C.J. A personal development strategy : its impact on reducing of accidents and increase in productivity : part one. Canadian Occupational Safety. Vol. 25, no. 3 (May/June 1987). p. 12-16

Lafferty, C.J. A personal development strategy : its impact on reducing of accidents and increase in productivity : part two. Canadian Occupational Safety. Vol. 25, no. 4 (Aug./Sept. 1987). p. 3-5, 13-18

SAFETY INFOGRAMs : personal protective equipment. CCOHS, 1988

Selection, care and use of respirators : occupational health and safety. Rexdale, Ont. : Canadian Standards Association, May 1982

Wuorinen, V. A basic occupational health and safety program. Hamilton, Ont. : CCOHS, 1986

Wuorinen, V. Job hazard analysis. Hamilton, Ont. : CCOHS, 1987

Zohar, D. Promoting the use of personal protective equipment by behavior modification techniques. Journal of Safety Research. Vol. 12, no. 2 (summer 1980). p. 78-85